

Patent
Attorney Docket No. 05725.0807-00
Application No.: 09/719,101
Customer No. 22,852

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re Application of:

Isabelle ROLLAT-CORVOL et al.

Application No.: 09/719,101

Filed: February 23, 2001

For: COSMETIC COMPOSITION
COMPRISING AT LEAST ONE TACKY
POLYMER AND AT LEAST ONE FIXING
POLYMER

Group Art Unit: 1617

Examiner: Shengjun WANG

RECEIVED

JAN 20 2004

Mail Stop Appeal Brief- Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

TECH CENTER 1600/2900

Sir:

01/08/2004 JADD01

00000059 09719101

01 FC:1402

330.00 OP

APPEAL BRIEF UNDER 37 C.F.R. § 1.192

This is an appeal to the Board of Patent Appeals and Interferences ("the Board") from the final Office Action dated January 8, 2003, finally rejecting claims 38-58, 60, 69, 78, 79, 83, 84, and 88-106 in the above-referenced patent application. The appealed claims, as rejected, are set forth in the attached Appendix.

In support of the Notice of Appeal filed July 7, 2003, and pursuant to 37 C.F.R. § 1.192, Appellants present in triplicate this brief and enclose herewith a check for the fee of \$330.00 required under 37 C.F.R. § 1.17(c). A Petition and fee for a four-month

FINNEGAN
HENDERSON
FARABOW
GARRETT &
DUNNER LLP

1300 I Street, NW
Washington, DC 20005
202.408.4000
Fax 202.408.4400
www.finnegan.com

extension of time are also enclosed. If any additional fees are required or if the enclosed payment is insufficient, Appellants request that the required fees be charged to Deposit Account No. 06-0916.

I. Real Party in Interest

L'Oréal, S.A. is the assignee of record.

II. Related Appeals and Interferences

Appellants' undersigned legal representative knows of no other appeals or interferences which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

III. Status of Claims

Claims 38-106 are pending in this application. Claims 59, 61-68, 70-77, 80-82, and 85-87 were withdrawn from consideration by the Examiner because they are directed to nonelected subject matter.

In the final Office Action dated January 8, 2003, the Examiner maintained his rejection of claims 38-58, 60, 69, 78, 79, 83, 84, and 88-106 under 35 U.S.C. § 102(b) as being anticipated by Lee et al. (EP 0 511 749 A2) ("*Lee*") and under 35 U.S.C. § 103(a) as being unpatentable over *Lee*. In the Advisory Action dated July 2, 2003, Examiner Shengjun Wang has withdrawn the § 102(b) rejection, but maintained the § 103(a) rejection of claims 38-58, 60, 69, 78, 79, 83, 84, and 88-106.

IV. Status of Amendments

No amendments to the claims have been filed subsequent to the final rejection dated January 8, 2003. A response to the final Office Action filed on June 9, 2003, was entered.

V. Summary of Invention

This invention relates to a cosmetic composition for keratinous fibers such as hair, comprising, in a cosmetically acceptable medium, at least one tacky polymer having a glass transition temperature (T_g) of less than 20°C and at least one fixing polymer having a glass transition temperature (T_g) greater than 15°C . Specification, page 1, lines 6-9. Also disclosed and claimed by Appellants are methods using and making this composition. *Id.* lines 9-14.

Hair products for shaping and/or maintaining hairstyles are generally compositions to be sprayed packaged either in an appropriate aerosol container pressurized with the aid of a propellant, or in a pump dispenser. *Id.* at page 2, lines 3-13. In addition, hairstyling gels or forms are generally aqueous and applied to wet hair before blow-drying or hair setting. *Id.* lines 14-24. However, these hair products can have the disadvantage of not fixing or maintaining the hairstyle for a sufficiently long period, therefore, may require repeated applications. *Id.* at page 2, line 24 - page 3, line 7. In addition, these hair products may impair the cosmetic properties of the hair, causing hair to become rough, difficult to disentangle, and lose its pleasant feel and appearance. *Id.* at page 3, lines 12-19.

The present inventors have solved at least one of these problems by combining at least one tacky polymer and at least one fixing polymer, as disclosed and claimed in the present invention; a combination unknown in the prior art. The results are novel cosmetic compositions, which can offer sufficiently strong fixing and maintaining effect for the style of the keratinous fibers, such as the hairstyle and/or offer good cosmetic properties, such as in terms of disentanglement, softness, and feel. *See id.* at page 3, lines 8-11, 16-19, and page 3, line 23 - page 4, line 10.

VI. Issue

The only issue presented for appeal is whether claims 38-58, 60, 69, 78, 79, 83, 84, and 88-106 are patentable under 35 U.S.C. § 103(a) over Lee et al. (EP 0 511 749 A2) ("*Lee*").

VII. Grouping of Claims

Each claim of the present application is separately patentable, and upon issuance of a patent will be entitled to a separate presumption of validity under 35 U.S.C. § 282. For convenience in handling this appeal, however, the claims will be grouped in one group. Thus, pursuant to 37 C.F.R. § 1.192(c)(7), in this appeal, the rejected claims 38-58, 60, 69, 78, 79, 83, 84, and 88-106 will stand or fall together with respect to the pending rejection.

FINNEGAN
HENDERSON
FARABOW
GARRETT &
DUNNER LLP

1300 I Street, NW
Washington, DC 20005
202.408.4000
Fax 202.408.4400
www.finnegan.com

VIII. Argument

The Examiner maintained the rejection of claims 38-58, 60, 69, 78, 79, 83, 84, and 88-106 under 35 U.S.C. § 103(a) as being unpatentable over Lee et al. (EP 0 511 749 A2) ("*Lee*"). Final Office Action dated January 8, 2003; Advisory Action dated July 2, 2003. Appellants respectfully submit that a prima facie case of obviousness has not been established for the reasons set forth below.

A. Legal Principles

To establish a prima facie case of obviousness, three basic criteria must be met, including there must be some suggestion or motivation, either in the reference or in the knowledge generally available to one of ordinary skill in the art, to modify the reference. M.P.E.P. § 2143. "Even when obviousness is based on a single prior art reference, there must be a showing of a suggestion or motivation to modify the teachings of that reference." *In re Kotzab*, 55 U.S.P.Q.2d 1313, 1316-17 (Fed. Cir. 1998). In addition, the suggestion or motivation "must be found in the prior art reference, not in the Appellant's disclosure." *In re Vaeck*, 20 U.S.P.Q.2d 1438, 1442 (Fed. Cir. 1991).

Here, the Examiner failed to establish a prima facie case of obviousness at least because the Examiner failed to provide evidence showing a motivation or suggestion to modify *Lee* to arrive at the presently claimed invention.

The threshold for establishing a motivation or suggestion to modify a prior art reference is high. The Federal Circuit has clearly stated that the evidence of a motivation or suggestion to modify a reference must be "clear and particular." *In re Dembicziak*, 175 F.3d 994, 999 (Fed. Cir. 1999). Further, the Examiner can satisfy the burden of establishing a prima facie case of obviousness "only by showing some

objective teaching in the prior art or that knowledge generally available to one of ordinary skill in the art would lead that individual to [modify or] combine the relevant teachings of the references." *In re Fine*, 5 U.S.P.Q.2d 1596, 1598 (Fed. Cir. 1988) (citations omitted) (emphasis added). The Federal Circuit has reaffirmed the Examiner's high burden to establish a prima facie case of obviousness and has emphasized the requirement of specificity. See *Kotzab*, 55 U.S.P.Q.2d, at 1317; see also *In re Sang-Su Lee*, 61 U.S.P.Q.2d 1430 (Fed. Cir. 2002).

B. Objective Evidence of Suggestion or Motivation to Modify Is Absent Here

The Examiner failed to provide any objective evidence of suggestion or motivation to modify *Lee*, let alone "clear and particular" evidence or specificity of factual inquiry of such.

The Examiner contended that *Lee* discloses "a hair treatment composition comprising a water-insoluble polymeric resin and a water-soluble amphoteric polymer (See abstract; page 3, lines 6-50; and pages 7-8, claims 1-8)." Office Action dated July 30, 2002, page 4. The Examiner further contended that *Lee* teaches "[m]ost preferred water-insoluble polymeric resins include polyesters functionalized with a sulpho group such as Eastman AQ polymers (see page 3, lines 15-20), meeting the limitation of a tacky polymer of the instant application." *Id.*; see Final Office Action dated January 8, 2003, page 3; see also Advisory Action dated July 2, 2003, page 2. In addition, the Examiner contended that *Lee* teaches acrylate-based copolymers can be used as the water-soluble amphoteric polymer, including octylacrylamide/acrylates/butylaminoethyl methacrylate copolymers, such as

AMPHOMER LV-71, "meeting the limitation of a fixing polymer [of the present invention]." Office Action dated July 30, 2002, page 4. The Examiner admitted that *Lee* does not teach a composition comprising AQ1350, an example of the at least one tacky polymer having a Tg of less than 20°C as recited in, at least, claim 1 of the present invention. *Id.* However, the Examiner contended that the disclosure in *Lee* on page 3, lines 15-30, is broad enough to cover the at least one tacky polymer having a Tg of less than 20°C as recited in, at least, claim 1 of the present invention. *Id.*; Final Office Action dated January 8, 2003, page 3; Advisory Action dated July 2, 2003, page 2. Therefore, the Examiner concluded that it would have been obvious for one of ordinary skill in the art to modify *Lee* to arrive at the presently claimed invention. Appellants disagree for at least the following reasons.

1. No Evidence of Suggestion or Motivation to Choose Tacky Polymers with Tg of Less Than 20°C from the "Eastman AQ Polymers" Disclosed in *Lee*

The Examiner failed to provide any evidence of suggestion or motivation to choose tacky polymers with Tg of less than 20°C from the "Eastman AQ Polymers" disclosed in *Lee*. The Examiner's primary contention is that because *Lee* teaches that "Eastman AQ Polymers" can be combined with a water-soluble amphoteric polymer to form a composition, it would have been obvious for one of ordinary skill in the art to choose any species of the "Eastman AQ Polymers" and combine it with the water-soluble amphoteric polymer disclosed in *Lee*. The Examiner's contention is similar to the species-genus argument, *i.e.*, because the genus is disclosed, any species is obvious. The M.P.E.P. clearly states that such an argument is improper if no evidence

of suggestion or motivation for one of ordinary skill in the art to pick and choose a specific species from the disclosed genus. See M.P.E.P. §2144.08 II.

First, the Examiner failed to provide any evidence showing that the disclosed "Eastman AQ Polymers" in *Lee* include the tacky polymers with Tg of less than 20°C. In fact, Appellants believe that at the time when *Lee* was filed, *i.e.*, December 17, 1992, "Eastman AQ Polymers" did not include those with Tg lower than 20°C. See, *e.g.*, WO 95/18191, cited in the present Specification, page 9, line 23, which has an earliest effective filing date of at least December 29, 1993, among the other two documents, WO 97/08261 and WO 97/20899; U.S. Patent No. 5,543,488, which is in the same patent family of WO 95/18191 and with an earliest effective filing date of at least December 29, 1993, cited in the Response to Final Office Action dated June 9, 2003, page 4; an article introducing Eastman AQ branched copolyesters published in December, 1995, cited in the Response to Final Office Action dated June 9, 2003, page 4. In other words, Appellants believe that the inventors of the invention disclosed in *Lee* could not have envisioned Eastman AQ polymers with Tgs lower than 20°C when they used the term "Eastman AQ Polymers," since such polymers were not known at that time.

Second, even assuming for the sake of argument that "Eastman AQ Polymers" included those polymers with Tgs lower than 20°C, the Examiner failed to provide any evidence of suggestion or motivation to choose those polymers with Tgs lower than 20°C from other polymers with Tgs higher than 20°C. "The fact that a claimed compound may be encompassed by a disclosed generic formula does not by itself render that compound obvious." *In re Baird*, 16 F.3d 380, 382, 29 USPQ 2d 1550, 1552

(Fed. Cir. 1994); see M.P.E.P. § 2144.08 II. Similarly, the fact that the tacky polymers with Tgs lower than 20°C may be encompassed by the disclosed "Eastman AQ Polymers" does not by itself render the tacky polymers with Tgs lower than 20°C obvious. The Examiner bears the burden of proof to establish the requisite suggestion or motivation to choose. The Examiner has not done so in this case.

2. Lee Teaches away from the Present Invention

In fact, the Examiner cannot meet this burden because *Lee* teaches away from the present invention, *i.e.*, *Lee* teaches away from choosing AQ polymers with Tgs lower than 20°C from "Eastman AQ Polymers" disclosed in *Lee*.

In making a § 103(a) rejection, the Examiner must consider the prior-art reference in its entirety, *i.e.*, as a whole, including portions that would lead away from the claimed invention. M.P.E.P. § 2141.02 (citing *W.L. Gore & Associates, Inc. v. Garlock, Inc.*, 721 F.2d 1540, 220 USPQ 303 (Fed. Cir. 1983)) (emphasis in original).

Viewed as a whole, *Lee* discloses a hair treatment composition "that includes a water-insoluble, dispensible polymeric resin having a viscosity of less than 2 centipoise at 25°C (when dispersed at 10% in water) and a water-soluble amphoteric polymer." Page 3, lines 7-11; see Abstract. Moreover, *Lee* states that "[t]he water-insoluble resin provides a good to moderate hold while importantly maintaining a low viscosity." *Lee* further states that among "Eastman AQ Polymers," "those have a glass transition temperature ranging from about 50°C to about 70°C, preferably around 55°C" are preferred; and "[m]ost preferred is Eastman AQ 55S." *Id.* lines 17-19. As shown by the enclosed product information brochure from Eastman, which was originally attached to

the Request for Reconsideration filed October 30, 2002, Eastman AQ 55S has a glass transition temperature of 55° C.¹

Therefore, *Lee* teaches that the mechanism for its composition to provide desired properties is due to the low viscosity required for its water-insoluble, dispensible polymeric resins, which can be chosen from Eastman AQ Polymers, especially those with Tgs ranging from about 50°C to about 70°C. Such a teaching would have led one of ordinary skill in the art away from choosing those with Tgs lower than 20°C as recited in, at least, claim 1 of the present invention.

**3. The Examiner Adopted an Improper
Obvious-to-try Approach**

At best, the Examiner's assertion of obviousness is based on what was obvious to try. In moving from the prior art to the claimed invention, however, one cannot base a determination of obviousness on what the skilled person might try or find obvious *to try*. Rather, the proper test requires determining what the prior art would have led the skilled person *to do*. The Federal Circuit has given some examples of what would constitute an "obvious to try" modification based on the prior art. *See In re O'Farrell*, 853 F.2d

¹ The Examiner argued that the enclosed Eastman AQ 55S product information brochure from Eastman cannot be considered as evidence, because it was not cited in an Information Disclosure Statement and does not provide evidence that the product is ethylene diglycol/cyclohexanedimethanol/isophthalates/sulphoisophthalates resin. Final Office Action dated January 8, 2003, page 3. Appellants disagree, because Eastman AQ 55S is already disclosed in *Lee* as an example of the aforementioned resin. In addition, the submission of the Eastman AQ 55S product information brochure is merely to provide factual evidence of the Tg value of Eastman AQ 55S, and to contradict the Examiner's assertions regarding the Eastman AQ polymers. Therefore, such an evidence should be considered.

894, 7 U.S.P.Q.2d 1673 (Fed. Cir. 1988). For example, "what was 'obvious to try' was to explore a new technology or general approach that seemed to be a promising field of experimentation, where the prior art gave only general guidance as to the particular form of the claimed invention or how to achieve it." *Id.* at 903, 7 U.S.P.Q.2d at 1681 (citations omitted).

In the present case, *Lee*, at best, provides only a general guidance to use "Eastman AQ Polymers" in combination with a water-soluble amphoteric polymer. It may have been, at best, obvious to try each polymer encompassed by "Eastman AQ Polymers" in order to arrive at the claimed invention. Such an obvious-to-try standard, however, does not support a rejection under section 103. See *Ecolochem, Inc. v. Southern Cal. Edison Co.*, 227 F.2d 1361, 1371, 56 U.S.P.Q.2d 1065, 1075 (Fed. Cir. 2000).

Therefore, this rejection is improper and should be reversed and withdrawn.

FINNEGAN
HENDERSON
FARABOW
GARRETT &
DUNNER LLP

1300 I Street, NW
Washington, DC 20005
202.408.4000
Fax 202.408.4400
www.finnegan.com

IX. Conclusion

In view of the foregoing, Appellants respectfully request that the § 103(a) rejection be reversed and withdrawn.

Please grant any extensions of time required to enter this Brief and charge any additional required fees to our deposit account 06-0916.

Respectfully submitted,

FINNEGAN, HENDERSON, FARABOW,
GARRETT & DUNNER, L.L.P.

Dated: January 7, 2004

By: 

Ningling Wang
Reg. No. 52,412

Enclosures:

A copy of Eastman AQ 55S product information brochure obtained from
(www.eastman.com/product_information/producthome.asp?product=1050);

A copy of an article entitled "Water Dispersible Hot Melt Adhesive Raw Material"
published in *Adhesive Age*, December 1995; and

Appendix - Pending Rejected Claims.

FINNEGAN
HENDERSON
FARABOW
GARRETT &
DUNNER LLP

1300 I Street, NW
Washington, DC 20005
202.408.4000
Fax 202.408.4400
www.finnegan.com

APPENDIX - PENDING REJECTED CLAIMS

38. A cosmetic composition for keratinous fibers comprising, in a cosmetically acceptable medium, at least one tacky polymer having a glass transition temperature (T_g) of less than 20°C and at least one fixing polymer having a glass transition temperature (T_g) greater than 15°C .

39. A composition according to claim 38, wherein said at least one tacky polymer has a peeling profile defined by at least a maximum peeling force $F_{\text{max}} > 3$ Newtons.

40. A composition according to claim 39, wherein said at least one tacky polymer has a peeling profile defined by at least a maximum peeling force $F_{\text{max}} > 5$ Newtons.

41. A composition according to claim 38, wherein said keratinous fibers are chosen from hair.

42. A composition according to claim 39, wherein when said glass transition temperature of said at least one tacky polymer is less than -15°C , and wherein said peeling profile is further defined by at least an energy for separation $E_{s(M/V)}$ of less than $300 \mu\text{J}$.

43. A composition according to claim 40, wherein when said glass transition temperature of said at least one tacky polymer is less than -15°C , and wherein said

peeling profile is further defined by at least an energy for separation $E_{s(M/V)}$ of less than 300 μJ .

44. A composition according to claim 38, wherein said at least one tacky polymer is chosen from branched sulfonic polyester polymers and (meth)acrylic ester polymers.

45. A composition according to claim 38, wherein said at least one tacky polymer is present in an amount greater than 0.01% by weight relative to the total weight of the composition.

46. A composition according to claim 45, wherein said at least one tacky polymer is present in an amount greater than 0.1% by weight relative to the total weight of the composition.

47. A composition according to claim 46, wherein said at least one tacky polymer is present in an amount greater than 0.5% by weight relative to the total weight of the composition.

48. A composition according to claim 38, wherein said at least one fixing polymer has a glass transition temperature (T_g) greater than 25°C.

49. A composition according to claim 38, wherein said at least one fixing polymer is present in an amount greater than 0.01% by weight relative to the total weight of the composition.

50. A composition according to claim 49, wherein said at least one fixing polymer is present in an amount greater than 0.1% by weight relative to the total weight of the composition.

51. A composition according to claim 44, wherein said branched sulfonic polyester polymers are formed from: (i) at least one dicarboxylic acid carrying two functional groups, wherein said functional groups are chosen from functional groups other than sulfonic groups;

(ii) at least one sulfomonomer comprising at least one sulfonic group and carrying two functional groups, wherein said functional groups are chosen from hydroxyl groups, carboxyl groups and amino groups;

(iii) at least one diol and optionally at least one diamine;

(iv) optionally at least one monomer carrying two functional groups, wherein said at least one monomer is chosen from hydroxycarboxylic acids, and aminocarboxylic acids; and

(v) at least one compound carrying at least three functional groups chosen from amino groups, alcohol groups, and carboxylic acid groups.

52. A composition according to claim 51, wherein said branched sulfonic polyester polymers are formed from:

(i) said at least one dicarboxylic acid carrying two functional groups, wherein said functional groups are chosen from functional groups other than sulfonic groups;

(ii) 2 to 15 relative mol% of said at least one sulfomonomer comprising at least one sulfonic group and carrying two functional groups, wherein said functional groups are chosen from hydroxyl groups, carboxyl groups and amino groups;

(iii) said at least one diol and optionally said at least one diamine;

- (iv) 0 to 40 relative mol% of said at least one monomer carrying two functional groups, wherein said at least one monomer is chosen from hydroxycarboxylic acids, and aminocarboxylic acids; and
- (v) 0.1 to 40 relative mol% of said at least one compound carrying at least three functional groups chosen from amino groups, alcohol groups, and carboxylic acid groups.

53. A composition according to claim 51, wherein said carboxylic acid functions are present in a total number equal to a total number of said diol and said optional diamine functions combined.

54. A composition according to claim 51, wherein said at least one dicarboxylic acid carrying two functional groups (i) is chosen from aliphatic dicarboxylic acids, alicyclic dicarboxylic acids, and aromatic dicarboxylic acids.

55. A composition according to claim 51, wherein said at least one dicarboxylic acid carrying two functional groups (i) is chosen from 1,4-cyclohexanedioic acid, succinic acid, glutaric acid, adipic acid, azelaic acid, sebacic acid, fumaric acid, maleic acid, 1,3-cyclohexanedioic acid, phthalic acid, terephthalic acid, and isophthalic acid.

56. A composition according to claim 51, wherein said at least one sulfomonomer comprising at least one sulfonic group and carrying two functional groups (ii) is chosen from dicarboxylic acids comprising at least one metal sulfonate group, dicarboxylic acid esters comprising at least one metal sulfonate group, glycols

comprising at least one metal sulfonate group, and hydroxy acids comprising at least one metal sulfonate group.

57. A composition according to claim 51, wherein said at least one diol of (iii) is chosen from alkanediols and polyalkylene diols.

58. A composition according to claim 51, wherein said at least one diol of (iii) is chosen from ethylene glycol, propylene glycol, diethylene glycol, triethylene glycol, and polypropylene glycol.

60. A composition according claim 51, wherein said at least one compound carrying at least three functional groups chosen from amino groups, alcohol groups, and carboxylic acid groups (v) is chosen from trimethylolethane, trimethylolpropane, glycerol, pentaerythritol, sorbitol, trimellitic anhydride, erythritol, threitol, dipentaerythritol, pyromellitic dianhydride, and dimethylpropionic acid.

69. A process for manufacturing a cosmetic hairstyling formulation comprising including in said cosmetic hairstyling formulation at least one tacky polymer having a glass transition temperature (T_g) of less than 20°C and at least one fixing polymer having a glass transition temperature (T_g) greater than 15°C .

78. A composition according to claim 38, wherein said at least one fixing polymer of said composition is chosen from anionic, cationic, amphoteric, and nonionic fixing polymers.

FINNEGAN
HENDERSON
FARABOW
GARRETT &
DUNNER LLP

1300 I Street, NW
Washington, DC 20005
202.408.4000
Fax 202.408.4400
www.finnegan.com

79. A composition according to claim 38, wherein said at least one fixing polymer is either solubilized in said composition or dispersed in said composition.

83. A composition according to claim 78, wherein said amphoteric fixing polymers are chosen from:

(1) polymers comprising at least one unit B and at least one unit C randomly distributed in the polymer chain of said polymers, wherein said at least one unit B is chosen from monomeric units derived from at least one monomer comprising at least one basic functional group, and wherein said at least one unit C is chosen from monomeric units derived from at least one acidic monomer comprising at least one group chosen from carboxylic groups and sulfonic groups,

(2) polymers comprising at least one unit B and at least one unit C randomly distributed in the polymer chain of said polymers, wherein said at least one unit B and said at least one unit C are each chosen from monomeric units derived from at least one zwitterionic monomer chosen from zwitterionic monomers of carboxybetaines and zwitterionic monomers of sulfobetaines,

(3) polymers comprising a cationic polymer chain formed from at least one unit B and at least one unit C, wherein said cationic polymer chain comprises at least one amine group chosen from primary, secondary, tertiary, and quaternary amine groups, wherein at least one of said at least one amine group carries a group chosen from carboxylic groups and sulfonic groups, wherein said carried group is attached by way of a hydrocarbon linker, and

(4) polymers comprising at least one ethylene- α,β -dicarboxylic unit wherein one of said two carboxylic groups has been caused to react with at least one polyamine comprising at least one amine group chosen from primary and secondary amine groups.

84. A composition according to claim 83, wherein, when said at least one unit B in (1) is chosen from monomeric units derived from at least one monomer comprising at least one basic functional group, said at least one basic functional group being a basic nitrogen atom.

88. A composition according to claim 38, wherein said at least one fixing polymer is dispersed in said composition and is chosen from polymers formed from at least one acrylic monomer, polymers formed from at least one acrylic ester monomer, polymers formed from at least one methacrylic monomer, polymers formed from at least one methacrylic ester monomer, and polymers formed from at least one styrene monomer.

89. A vaporizable composition, a foam, a gel or a lotion comprising a cosmetic composition for keratinous fibers, which comprises, in a cosmetically acceptable medium, at least one tacky polymer having a glass transition temperature (T_g) of less than 20°C and at least one fixing polymer having a glass transition temperature (T_g) greater than 15°C.

90. A composition according to claim 38, wherein said cosmetically acceptable medium comprises at least one solvent chosen from water and alcohols.

91. A composition according to claim 38 further comprising at least one additive chosen from gelling agents and foaming agents.

92. A composition according to claim 38 further comprising at least one propellant.

FINNEGAN
HENDERSON
FARABOW
GARRETT &
DUNNER LLP

1300 I Street, NW
Washington, DC 20005
202.408.4000
Fax 202.408.4400
www.finnegan.com

93. A composition according to claim 92, wherein said at least one propellant is chosen from compressed gases, and liquefied gases.

94. A composition according to claim 92, wherein said at least one propellant is chosen from gases.

95. A composition according to claim 92, wherein said at least one propellant is chosen from gases which are soluble in said composition.

96. A composition according to claim 93, wherein said compressed gases and liquified gases are chosen from compressed air, carbon dioxide, and nitrogen.

97. A composition according to claim 95, wherein said gases which are soluble in said composition are chosen from dimethyl ether and fluorinated hydrocarbons.

98. An aerosol device comprising (1) a compartment comprising an aerosol composition comprising a liquid phase and at least one propellant, wherein said liquid phase comprises, in an appropriate solvent, a cosmetic composition for keratinous fibers comprising, in a cosmetically acceptable medium, at least one tacky polymer having a glass transition temperature (T_g) of less than 20°C and at least one fixing polymer having a glass transition temperature (T_g) greater than 15°C, and (2) a member for distributing said aerosol composition.

99. A process of treating keratinous fibers comprising applying to said fibers, before and/or after shaping a hairstyle, a cosmetic composition for keratinous fibers comprising, in a cosmetically acceptable medium, at least one tacky polymer having a glass transition temperature (T_g) of less than 20°C and at least one fixing polymer having a glass transition temperature (T_g) greater than 15°C .

100. A process according to claim 99, wherein said keratinous fibers are chosen from hair.

101. A composition according to claim 39, wherein said maximum peeling force F_{max} is measured with an extensometer and is a maximum tensile force for peeling apart 38 mm^2 coated surfaces of two rigid, inert, and nonabsorbent supports (A) and (B) placed opposite each other, wherein said surfaces have been (1) coated with a tacky polymer dissolved at 5% in a solvent, at the rate of 1 mg/mm^2 , (2) dried for 24 hours at 22°C under a relative humidity of 50%, (3) compressed for 20 seconds under a force of 3 Newtons, and (4) pulled apart for 30 seconds at a rate of 20 mm/min .

102. A composition according to claim 101, wherein said solvent is chosen from aqueous solvents, aqueous-alcoholic solvents, and alcoholic solvents.

103. A composition according to claim 101, wherein said supports (A) and (B) are chosen from polyethylene supports, polypropylene supports, metal alloy supports, and glass supports.

104. A composition according to claim 42, wherein said $E_{s(MV)}$ is an amount of energy provided by an extensometer for peeling apart 38 mm^2 coated surfaces of two

rigid, inert, and nonabsorbent supports (C) and (D) placed opposite each other, wherein one of said two supports comprises cut glass and a second of said two supports is chosen from polyethylene supports, polypropylene supports, metal alloy supports, and glass supports, and wherein said surfaces have been (1) coated with a tacky polymer dissolved at 5% in a solvent, at the rate of 1 mg/mm², (2) dried for 24 hours at 22°C under a relative humidity of 50%, (3) compressed for 20 seconds under a force of 3 Newtons, and (4) pulled apart for 30 seconds at a rate of 20 mm/min.

105. A composition according to claim 104, wherein said solvent is chosen from aqueous solvents, aqueous-alcoholic solvents, and alcoholic solvents.

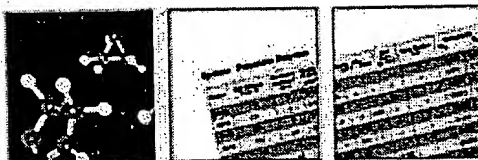
106. A composition according to claim 104, wherein said $E_{s(M/V)}$ is an amount of energy calculated by means of the following formula:

$$\frac{X_{s2}}{X_{s1} + 0.05} \int F(x) dx$$

- where $F(x)$ is a force necessary to produce a movement (x),
- x_{s1} is the movement in millimeters produced by a maximum tensile force, and
- x_{s2} is the movement in millimetres produced by a tensile force sufficient to completely separate said surfaces of said supports (C) and (D).

FINNEGAN
HENDERSON
FARABOW
GARRETT &
DUNNER LLP

1300 I Street, NW
Washington, DC 20005
202.408.4000
Fax 202.408.4400
www.finnegan.com

EASTMAN

customer center

search site

search tips

Update your profile
Change your password

[home](#)[about Eastman](#)[services](#)[technical solutions](#)[customer center](#)[markets](#)[product information](#)[brands](#)[processes](#)[news center](#)[investor information](#)[employment](#)[privacy policy](#)[site index](#)[contact us](#)[product information](#) | [chemicals](#) | [polymers](#)**EASTMAN AQ 55S Polymer**

EASTMAN AQ polymer 55S is a water-dispersible linear polyester. AQ 55S is an anionic polymer and is compatible with a broad range of anionic and nonionic products. *EASTMAN AQ* polymers are relatively high molecular weight, amorphous polyesters that disperse directly in water without the assistance of organic cosolvents, surfactants, or amines. *EASTMAN AQ* polymers differ chiefly in glass transition temperature (T_g) or softening point. The "dry" T_g of each polyester is indicated by its numerical designation. *EASTMAN AQ 55S* polymer has a T_g of 55.

Supplemental Documents

- [Applications](#)
- [MSDS \(USA-English\)](#)
- [MSDS \(All Regions\)](#)
- [Technical Data Sheet](#)
- [Sales Specifications](#)

Additional Publications

- [CB-1 - Eastman Products for Cosmetics and Personal Care](#)
- [CB-41 EASTMAN AQ Polymers for Cosmetics and Personal Care](#)
- [CB-107 Sand Beige Makeup \(oil-free\)](#)

[home](#) | [about Eastman](#) | [services](#) | [technical solutions](#) | [customer center](#) | [markets](#) | [product information](#) | [brands](#) | [processes](#)
[news center](#) | [investor information](#) | [employment](#) | [privacy policy](#) | [site index](#) | [contact us](#)

Copyright 2002 Eastman Chemical Company. All rights reserved. Please see our [Legal Information](#).

DECEMBER 1995

ADHESIVES

FOR THE ADHESIVE & SEALANT MANUFACTURER & USER

Age

Flexible Solution

*Surface Mount
Production
Without Solder*

**Activated Rubber Particles
For High Performance**

**Acrylic Emulsion
Laminates Paper To Foil**

ON THE SCENE
Page 38

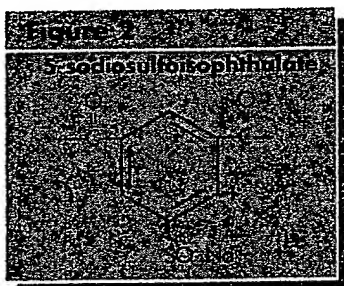
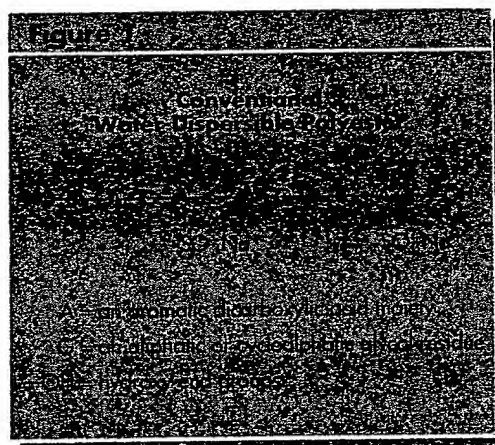
Water Dispersible Hot Melt Adhesive Raw Material

By **Richard A. Miller**, senior technical service representative, and **Scott E. George**, principal research chemist, Eastman Chemical Co., Kingsport, Tenn.

Hot melt adhesives are useful for bonding various substrates such as wood, paper, plastics, nonwoven assemblies, textiles and other materials. One use for which they are well-suited is the sealing of corrugated and paper board boxes. This application calls for high bond strength to resist shock, stress, high humidity and extreme temperatures encountered in transportation and storage. In addition, the melt point, wetting time, initial tack, setting time, pot life and general handling characteristics on automatic packaging machinery are essential considerations.

Paper products must be recycled to conserve material resources and landfill space. It is thus a general practice in the paper industry to recover the used and waste material and to repulp it for use in products such as cardboard. The use of polyolefin-based hot melt adhesives to seal boxes has presented problems in repulping. Hot melt and pressure-sensitive adhesives are generally insoluble in water and difficult to disperse during the repulping process. In addition, many polymer emulsions are non-redispersible. This makes certain paper products that utilize insoluble adhesives unattractive for repulping since the adhesive particles can introduce inconsistencies into the finished product.

One way to remove insoluble adhesives from waste paper products is to use adhesives having a density different from that of water and pulp in water, thus permitting gravitational separa-



tion. However, this requires separation steps that can increase recycling costs.

Water-soluble or dispersible adhesives such as dextrin, cellulose gums, and animal glues derived from the hides and bones of animals are low in strength, they fail to adhere well to paper and wood stocks with coatings or heavy ink applications, and they may require special treatment and handling because of their high viscosity. Therefore, the use of these materials as base polymers in adhesives is limited.

Attempts to produce synthetic water-dispersible hot melt adhesives have been unsuccessful due to poor adhesion, thermal stability, strength, and cold-flow resistance. Furthermore, high cost and processing problems have precluded their use.

In addition to paper and paper products, there are other disposable items, such as diapers and sanitary napkins, in which hot melt and aqueous adhesives are used. However, the use of most hot melts in these products complicates the disposal process.

Accordingly, it would be most desirable to produce water-dispersible aqueous or hot melt adhesives at reasonable costs that maintain the desirable properties of non-dispersible adhesives.

Technical Aspects of Polyesters

Eastman's conventional water-dispersible polyesters are linear, amorphous materials comprised of aromatic acids and aliphatic glycols. Available in both pellet and dispersion form, they range in glass transition temperature (T_g) from 29° to 55°C. Their water-dispersibility is due to the presence of pendent sodiosulfo groups randomly distributed along the polymer backbone, as shown in Figure 1.

Incorporation of the ionic moieties is readily accomplished by copolymerization of 5-sodiosulfoisophthalate units into the polymer backbone (Figure 2).

The following discussion covers the key differences in structure and properties between the branched polyester and conventional water-dispersible polyesters.

The unique properties of the new polyester are derived from a branched architecture and a specific combination of monomers resulting in a low T_g and enhanced compatibility with other resins. The low T_g provides, in part, the means by which water-dispersibility is readily obtained at or below room temperature, while the conventional water-dispersible polyesters are much more difficult to disperse.

The branched structure of the polyester results in low melt viscosity profiles that are required for hot melt adhesive formulations. Potentially available in inherent viscosities (IVs) ranging from 0.2 to 0.65, the branched polyester exhibits melt viscosities ranging from 10,000 cP to 100,000 cP at 177°C; a 0.3 IV branched polyester typically exhibits a viscosity of approxi-

Reprinted courtesy of Intertec Publishing Corp.

© ADHESIVES AGE, December 1995, Overland Park, KS 66212. All rights reserved.

mately 35,000 cP at 177°C. By comparison, the conventional water-dispersible polyester with a nominal IV of 0.3 will exhibit a melt viscosity of about 300,000 cP at 280°C, or over 1 million cP at 177°C. Since both types of material have the same IV, one might expect them to have the same molecular weight. However, their true molecular weights differ since branching most likely lowers the radius of gyration and thus decreases the hydrodynamic volume. Furthermore, the branched polyester can be offered as a blend of both linear and branched polymers.

These amorphous polyesters are thermoplastic rather than thermosetting, and they can therefore be remelted to form a heat-sealable bond.

Incorporation into Adhesive Formulations

This unique branched polyester can be combined with a range of other commonly used adhesive raw materials. The tackifying resins useful in adhesive compositions are generally polar in nature and have a Ring and Ball Softening Point greater than 80°C. Water-dispersibility and compatibility with a variety of tackifying resins/rosins were evaluated. Results indicate excellent compatibility with terpene, pentaerythritol esters of hydrogenated rosin, and highly acid functional wood rosins.

Various plasticizing or extending oils may be incorporated into the base polyester. Compatible plasticizers include white mineral oils and benzoate plasticizer, such as dipropylene glycol dibenzoate. Conventional hot melt adhesives employ wax diluents which reduce the melt viscosity and enhance the set time. In small concentrations, these waxes are compatible to a degree with the new water-dispersible polyester.

Among the applicable stabilizers or antioxidants that may be used are high molecular weight hindered phenols and multifunctional phenols such as sulfur and those containing phosphorous. The water-dispersible branched polyester is manufactured with both primary and secondary antioxidants.

Physical Properties of Branched Polyesters

The Tg of branched polyesters vary from about -9°C to 4°C, as measured by Differential Scanning

Table I

Typical Quick Stick Adhesion
0.2 IV Branched Polyester

Substrate	Adhesion (g/cm²)
Aluminum	1000
Steel	1000
Stainless Steel	1000
Brass	1000
Copper	1000
Galvanized Steel	1000
Carbon Steel	1000
Aluminum	1000
Steel	1000
Stainless Steel	1000
Brass	1000
Copper	1000
Galvanized Steel	1000
Carbon Steel	1000

Table II

Typical T-Peel Adhesion
0.4 IV Branched Polyester

Substrate	Adhesion (g/cm²)
Aluminum	1000
Steel	1000
Stainless Steel	1000
Brass	1000
Copper	1000
Galvanized Steel	1000
Carbon Steel	1000
Aluminum	1000
Steel	1000
Stainless Steel	1000
Brass	1000
Copper	1000
Galvanized Steel	1000
Carbon Steel	1000

Calorimetry (DSC). Brookfield Thermosel viscosities run on a Model LV HV-11 viscometer indicate that the branched polyesters have viscosities at 177°C of 10,000 to 100,000 cP, depending on molecular weight.

Branched polyesters offer a good combination of properties when used as base polymers in hot melt or aqueous dispersions for paper products. They are easily dispersed and recycled. They offer significant improvements over current dispersible hot melt adhesive raw materials in strength and ther-

mal stability. Furthermore, they offer improved adhesion, especially with respect to treated polypropylene and polyethylene.

The branched polyesters are clear solids with Gardner color ratings below 3. Ring and Ball Softening Points range from approximately 80° to 113°C, according to ASTM E28. Tensile strength, according to ASTM D412, ranges from 0.9 to 0.40 MPa, with elongation ranging from 400 to 900 percent.

To evaluate the rheology properties of branched polyester, three dynamic mechanical analyses were performed using an RMS-800 rheometer. Inherent viscosities of 0.2, 0.4 and 0.6 were run using both temperature and frequency sweeps. Results of the frequency sweep indicate that these polyesters are not highly shear-sensitive and could be considered fairly Newtonian in their behavior. The temperature sweep from 50° to 160°C with constant shear indicated some viscosity reduction with the higher IV material showing a more linear pattern. See Figures 3-6.

The typical quick stick of neat branched polyester base material is reported. Table I reports results for a 0.2 IV polyester, while Table II gives T-peel results for a 0.4 IV material. In each instance, the polyester was heat-coated onto Mylar film which had a slight corona treatment. Tests were conducted on various substrates according to Test Method PSTC-5 and ASTM D1876.

In addition to testing neat polyesters, physical tests were performed on blends containing polyester, tackifier and oil. Tests were conducted according to typical ASTM standards commonly used in the adhesive industry. Table III compares the properties of a water-dispersible branched polyester-based hot melt with formulations based on ethylene-vinyl acetate (EVA) and styrene-isoprene-styrene block copolymer (SIS).

Table IV shows typical formulations and properties for water-dispersible hot melt adhesives based on branched polyesters having IVs of 0.2, 0.4, and 0.6. It is seen that in all three cases, dispersion was achieved in less than 24 hours.

Aqueous Dispersions

Table V gives the T-peel adhesion for a 40 percent aqueous dispersion of a 0.4 IV branched polyester in tap

Table III

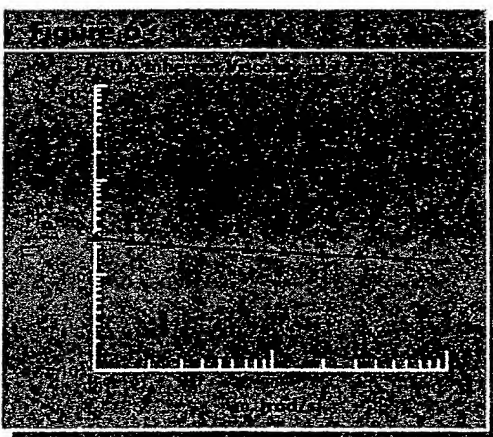
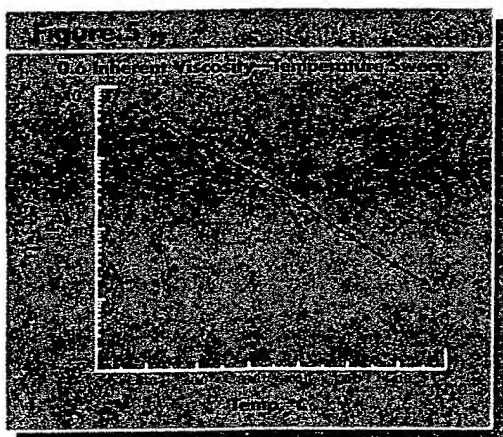
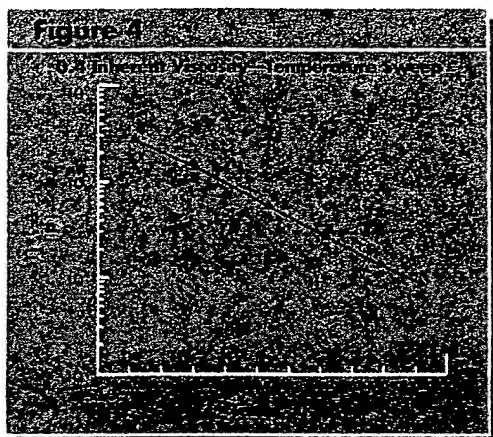
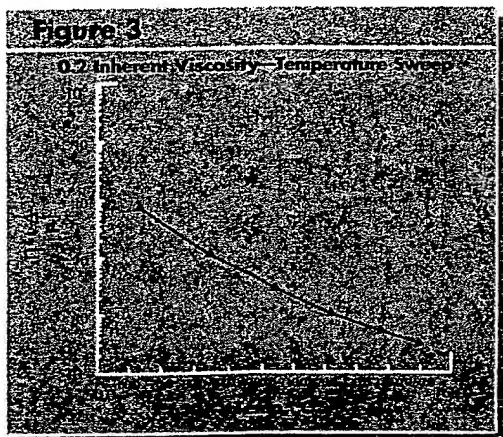
Comparison of Hot Melt Adhesive Based on Branched Polyester, EVA and SIS

Formulations	
Hot Melt Based on Branched Polyester	Hot Melt Based on EVA and SIS
Ingredients	Ingredients
1. Branched Polyester (0.2 IV)	1. EVA (Mn 100,000)
2. Tackifier (Rosin)	2. SIS (Mn 100,000)
3. Wax (Paraffin)	3. Tackifier (Rosin)
4. Stabilizer (BHT)	4. Wax (Paraffin)
5. Antioxidant (Irganox 1010)	5. Stabilizer (BHT)
6. Antioxidant (Irganox 1010)	6. Antioxidant (Irganox 1010)
Physical Properties	
Tg (°C)	
Tensile Strength (MPa)	
Elongation (%)	
Adhesion (g/cm²)	
T-Peel Adhesion (g/cm)	
Dispersion Time (hours)	

water. The dispersion was coated neat at a dry film thickness of 2 mils, and then heat-sealed to various substrates.

The data, particularly T-peel adhesion, indicate that the

polyester-based adhesive demonstrates good adhesion to olefin films and aluminum foil while maintaining water-dispersibility.



A 0.4 IV branched polyester dispersion was coated onto polyethylene film, bonded to an absorbent wood pulp product, and allowed to dry overnight. Five grams of this assembly was placed in 200 mL of tap water. Within two hours, the polyester adhesive dispersed. Five grams of a diaper assembly was placed in a 0.2 molar alkaline ionic solution similar to human perspiration or urine. The bond assembly remained intact and the adhesive did not disperse. The ionic solution, prepared according to AATCC Test Method 15-1985, was as follows:

- 1L distilled water
- 10g sodium chloride
- 4g ammonia carbonate
- 1g disodium hydrogen phosphate
- 0.25g distidine monohydrochloride

Conclusion

The properties of a water-dispersible

branched polyester suggest its use in the formulation of a variety of aqueous and hot melt adhesives with improved recycling characteristics. Due to its superior adhesion to olefin films and its non-dispersibility in high ionic strength mediums such as simulated body fluids, water-dispersible branched polyester should be an excellent base polymer for adhesives used in packaging and nonwoven product assembly applications.

Advantages of the water-dispersible branched polyester include:

- readily dispersible in common tap water
- non-dispersible in ionic solutions (similar to body fluids)
- range of viscosities available
- low odor
- light to clear color

Research into the chemistry of polyesters is an ongoing program, and the future should see the introduction of other new products based on these materials.

Table IV

Hot Melt Adhesives Based on Branched Polyester

Ingredient	Formulation	
	Wt. %	Wt. %
0.4 IV branched polyester	100	100
0.2 IV branched polyester	100	100
0.6 IV branched polyester	100	100
0.8 IV branched polyester	100	100
1.0 IV branched polyester	100	100
1.2 IV branched polyester	100	100
1.4 IV branched polyester	100	100
1.6 IV branched polyester	100	100
1.8 IV branched polyester	100	100
2.0 IV branched polyester	100	100
2.2 IV branched polyester	100	100
2.4 IV branched polyester	100	100
2.6 IV branched polyester	100	100
2.8 IV branched polyester	100	100
3.0 IV branched polyester	100	100
3.2 IV branched polyester	100	100
3.4 IV branched polyester	100	100
3.6 IV branched polyester	100	100
3.8 IV branched polyester	100	100
4.0 IV branched polyester	100	100
4.2 IV branched polyester	100	100
4.4 IV branched polyester	100	100
4.6 IV branched polyester	100	100
4.8 IV branched polyester	100	100
5.0 IV branched polyester	100	100
5.2 IV branched polyester	100	100
5.4 IV branched polyester	100	100
5.6 IV branched polyester	100	100
5.8 IV branched polyester	100	100
6.0 IV branched polyester	100	100
6.2 IV branched polyester	100	100
6.4 IV branched polyester	100	100
6.6 IV branched polyester	100	100
6.8 IV branched polyester	100	100
7.0 IV branched polyester	100	100
7.2 IV branched polyester	100	100
7.4 IV branched polyester	100	100
7.6 IV branched polyester	100	100
7.8 IV branched polyester	100	100
8.0 IV branched polyester	100	100
8.2 IV branched polyester	100	100
8.4 IV branched polyester	100	100
8.6 IV branched polyester	100	100
8.8 IV branched polyester	100	100
9.0 IV branched polyester	100	100
9.2 IV branched polyester	100	100
9.4 IV branched polyester	100	100
9.6 IV branched polyester	100	100
9.8 IV branched polyester	100	100
10.0 IV branched polyester	100	100

